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ABSTRACT

While the need for improved literacy in the work force is generally accepted, questions still remain as to what levels of literacy are required for different jobs and who will provide the necessary adult literacy training. To answer these questions, researchers must develop a database of information about literacy needs and deficiences. Developing such a database, however, is not easily accomplished. Upon discovering that employee performance in one area is unacceptable, employers can take any one of a number of actions that would change the nature of the job in question. In addition, literacy requirements change over time as organizations themselves change. Job analysis and validation are two possible means of assessing the literacy requirements of work. Each method has advantages and disadvantages that must be considered carefully when using them in a large-scale research project. Informal surveys of employers throughout the country indicate that the burden to improve employee quality rests mainly with the educational system. While employers are concerned about the literacy levels of their workers, many doubt whether literacy training by employers is effective. An examination of the remedial training policies of companies such as American Telegraph and Telephone suggests that, for a variety of reasons, employers are generally quite conservative about providing literacy training. (MN)

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Realities of Adult Literacy in Work Settings

Mary L. Tenopyr

Executive Summary

In dealing with the problems of adult literacy in our society, there is a need for more factual data. In particular, policy determination relative to preparing secondary school students for the world of work needs a scientific base.

It is difficult to specify literacy requirements for jobs for a number of reasons. Jobs evolve from the basic goals of the employer and are part of a total productive system. When there are literacy deficiencies on the part of employees, an employer may change any one or several parts of the system to solve the problems involved. Also, job requirements are not static, but dynamic, particularly in this era of rapidly changing technology.

In attempting to assess literacy requirements for work, it is possible to use methods of job analysis. These procedures, although relatively easy to apply, do not necessarily yield accurate data. Traditional validation, such as is used in testing, although difficult and expensive to apply, would provide better information about literacy requirements. It appears that a national effort in this area is needed.

Because of various problems associated with selecting employees, it appears that much of the burden of meeting the literacy requirements of the workforce will rest with the educational system. The role business should play in adult education is a matter for debate. However, it is clear that most businesses do not provide adult literacy training routinely and that the efforts in evaluating that training which has been done by business have not provided clear results.

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REALITIES OF ADULT LITERACY IN WORK SETTINGS

Mary L. Tenopyr

American Telephone and Telegraph Company

The need for improved literacy in the workforce has received national attention of late. The debates which have been generated have been for the most part healthful, if only because they have brought national and local educational policy to the attention of the populace. The portions of the debates which have a basis in fact and center upon actions to be taken in view of the facts have been particularly useful. Those debates which have been based upon information which may be apocryphal have not been so meaningful. To develop workable recommendations about educational policy requires a database of well developed, appropriate information. Until we have more of the right data, the policy-makers cannot be expected to make the important decisions they need to make about education in the future.

The need for facts, particularly relative to literacy requirements in the workplace, cannot be overemphasized. In fact, it will be the primary focus of this presentation. Obtaining the appropriate data, however, is

a complicated matter and requires a considerable cooperative effort on the part of the governmental, educational, and business sectors of the economy.

In the ensuing discussion, the term "literacy" will be used in the broadest sense to include the basic knowledge usually learned in formal schooling.

First, it is important to recognize that any employing organization functions as a system. Things like the literacy requirements for any given job are likely to change as various parts of the system change. It is very difficult to speak of fixed requirements of any job. Job requirements can, and do, frequently change. This is particularly true in this era of rapidly changing technology when some jobs are being abolished and in other jobs, duties are being reapportioned among individuals almost on a daily basis. In many ways, trying to fix upon the literacy requirements of a given job is like trying to hit a moving target.

Some background upon how jobs are formed and how job formation may affect the literacy requirements of a given job may be in order. In any employing organization the ultimate goals of an organization are established. Goals can include such things as making widgets at a profit, maintaining good relations in the community, or maintaining a safe workplace.

Then the tasks necessary to meet these goals are delineated. The tasks are then combined into groups of tasks which form the basis of a job, which by definition is the set of tasks common to the work of more than one employee. The literacy requirements of any job are determined on how the tasks are apportioned among jobs. For example, in a machine shop, a decision must be made as to whether each lathe operator will set up his or her own work or whether there will be a small group of set-up persons who set up the work for the operators. If this is the case, all this latter group has to do is run the machines according to the set up person's specifications. The work of setting up a machine requires reading blueprints, applying mathematics and spatial visualization and reasoning. If a company decides that all machine operators must set up their own work, there will be heavy education and ability requirements for all operators. If, on the other hand, the company decides to use set up persons, lower ability operators can be hired and there is a requirement for well developed cognitive abilities only for the small group of set up persons.

With this background, let us turn to the system aspects of the employment situation. A typical employing organization has, in the simplest sense, the following interrelated major components relative to hiring of the workforce.

1. Work assignment, job duties
2. Recruiting
3. Application of Employment Standards
4. Training

5. Performance of given work
6. Application of work standards and sanctions
7. Compensation
8. Promotion, transfer, and other employee programs.

In our machine shop, let us assume for the moment that all machine operators set up their own work. Let us further assume that there are too many errors being made as a result of improper set up and that this is directly attributable to employee ability. What can the employer do? First, the employer may reapportion the work and set up a new job of set up person, so that he or she does not need such cognitively skilled machine operators. Second, he or she can change recruiting practices. If machinists have been recruited only from the local high schools, recruiting may be expanded to include trade schools farther away from the business, or help wanted advertisements may be placed in newspapers circulated outside the immediate plant vicinity. A third step the employer might take is to stiffen employment standards. For example, administration of tests emphasizing mathematics and spatial reasoning might be added to the employment process. Fourth, the employer might change the nature and extent of training for the job. Programmed instruction might be substituted for instructor-led instructions. The length of training might be extended. The fifth option open to the employer is to automate, apply robots or computers so that the jobs may be done by less skilled persons. Another option open to the employer is to lower work standards; however, obviously, this action is seldom taken. The employer also may want to examine the compensation component of the system. Perhaps the wages the employer is paying machine operators are lower than rates paid by competitors, and to attract more

qualified operators the employer simply must increase the pay for the job. Finally, the employer may examine any number of policies that affect the quality of work. For example, a promotion-from-within-policy may attract more qualified workers. Offering better job security or more enlightened supervision may also help solve the problem.

It is important to emphasize that changing one component of this system affects all others. For example, if recruiting efforts are expanded, there may be no need to expand training time. If good selection tests are introduced, training time will probably be reduced. An increase in wages can serve to reduce the need for extensive recruiting.

When an employer is faced with a problem attributable to poor employee literacy, whether it be verbal, mathematical or spatial, it is difficult to predict exactly what the employer will do to rectify the situation. The first consideration is that the employer has many options from which to choose. Another and often more important consideration is that factors not under the employer's control may greatly affect the employer's decisions. In particular, the state of the economy as it relates to the employer is most important. In a period like the late 1960's when labor was scarce, an employer might have taken several of the options open. For example, if employee literacy were a problem, then the employer might have stepped up recruiting, increased training time, and increased wages. However, given the economic situation in the early 1980's, the same employer, should it be necessary to obtain new employees, might merely increase the hiring standards used in the employment office.

The social policy prevailing in the country also can greatly affect the employer's actions. If the employer wishes to undertake affirmative action to offset the educational problems which have left some segments of the population less prepared for work than others, he or she may lower hiring standards and increase training time.

Collective bargaining also often affects the choice of actions by the employer. For example, union contracts may hinder changing wage rates, introducing of automation to replace employees, or changing the allocation of job duties among employees. Also, if bargained wage rates become excessive so that the employer's prices are no longer competitive, an employer may well seek to introduce automation so that lower skilled, less expensive workers can be employed.

What has been said thusfar suggests a dynamic situation in which literacy deficiencies can be dealt with in various ways and in different ways at different times. Another factor to be considered is the rapidly changing technology which is tending to alter the distribution of the ability requirements of jobs. Present predictions (Levin & Rumberger, 1983) suggest a marked increase in the number of jobs with low skill requirements and rapid growth in a small number of jobs with high skill requirements. In other words, the variability in job difficulty is increasing. Many jobs will have their skill requirements lessened, whereas for a smaller number of jobs, ability requirements will be increased. If people enter these low skill jobs without good basic literacy, their opportunities for advancement may be severely limited. We may witness the formation of large occupational ghettos of people in

dead end jobs. Despite the good research base at present, it is difficult to make exact predictions about adult literacy requirements of the future. We should at least recognize that policy decisions based upon needs in today's workforce may not serve us well in the future.

Despite the fluidity of the present situation and the uncertainty of the future regarding adult literacy needs in the workforce, it should still be possible to establish a database to guide better educational policy decisions in the future. This, as I have emphasized before, would be an expensive and complicated effort, but unless we have dependable data on adult literacy requirements in the workplace, we cannot hope to prepare young people and displaced adults for productive work.

Much of the information we have now about adult literacy requirements in the workplace is anecdotal. This is not to say that the information is inaccurate or that careful study would yield grossly different results. However, a carefully developed database could be an asset in pinpointing problems more exactly, providing for evaluating educational programs, and monitoring changes in literacy requirements in these rapidly changing times.

There are various ways of going about developing this database. Probably the least expensive, but not necessarily the most accurate, would be through a method known as job analysis, which involves obtaining judgments about the abilities needed for adequate job performance. Key jobs could be selected in various employing organizations and be subjected to periodic analyses. Questionnaires regarding ability

requirements could be completed by supervisors and job incumbents. An alternative course would be to have expert job analysts study the jobs and estimate ability requirements. One might well ask whether such information does not exist today. The major hindrance to using existing data is that practically every employer has a different job analysis format or within the same company different formats for different purposes. In fact, there are no agreed upon professional standards for job analysis (American Psychological Association, Division of Industrial-Organizational Psychology, 1980).

Another problem is that one may describe jobs in a number of different languages. For example, one may make a catalog of tasks done, e.g., inserting the nozzle of a gasoline hose in the filler of an automobile tank. One may get estimates of abilities required in terms of the language of the educational field, e.g., calculating volume of a cylinder. One may also employ the language of aptitudes, e.g., spatial visualization or syllogistic reasoning.

One also has to choose among various ways of judging the importance of a task, ability, or other job measurement. For example, is a task important because it is frequently done? A pilot's safely making an emergency landing may be infrequently done, but it is obviously important. Is the task important because it occupies a considerable amount of time? A secretary may spend more time opening envelopes than typing, but which is more important? How does one decide which tasks are the most critical?

A further problem which complicates the use of job analysis is determining, relative to abilities, the degree to which an ability is required in a job. The same problem has vexed those who would set minimum competency standards for secondary education. How much ability is enough? The research in industrial psychology (Schmidt & Hunter 1977) indicates, relative to aptitudes, that the more ability a person has, the better he or she does the job. In other words, productivity will almost always be improved by improving employee qualifications. Thus, there is no magic number or ability level which can scientifically be set so that one can say a person is minimally qualified for a job. Also, one must consider the policy question of whether an employer will accept only the minimally qualified and not capitalize on individual differences and seek, in order to improve productivity, those who are more qualified.

Furthermore, there appears to be a dearth of scientific information that the judgments made in job analysis actually reflect reality (Tenopyr, 1984). There is indirect evidence to suggest that the ability-related judgments made in job analysis are not always appropriate. For example, the job of telephone directory assistance operator has been frequently judged to require a high degree of spelling ability. In fact, spelling is usually considered the most important ability for this job. Yet, in two American Telephone and Telegraph Company studies (Gael, Grant, and Ritchie, 1985; French, 1982) spelling tests were found to be less job related than other tests for predicting directory assistance operator performance. In other words, other abilities were found more important than spelling. Consequently, a spelling test is not currently used in the Bell System for selecting directory assistance operators.

In view of the many problems involving using job analysis alone for determining adult literacy requirements in work settings, it should probably not be the first choice among methods for solving the problem. However, if other methods prove to be too cumbersome or costly, a national job analytic study should be considered.

In industrial psychology, the most common way of determining ability requirements of jobs is through a procedure known as validation. Validation is a process by which it is determined whether a selection procedure, such as a test, is valid, that is, job related. A test is said to be valid if those who score low on the test do not do well on the job and those who score high on the test do the job well. If a test measures an ability not required by the job, it will have zero validity, that is, test scores have no relation to job success.

Validation, particularly of tests, has been a way of life in industrial psychology for decades. From test validation studies there is much information already available about the ability requirements of various types of jobs (Schmidt, Gast-Rosenberg, & Hunter 1980; Schmidt & Hunter, 1977; Schmidt, Hunter, Pearlman, and Shane, 1979). However, there are some problems in applying this work, since employers generally use short aptitude tests, involving such abilities as spatial reasoning or clerical perception. These abilities, on the surface, do not relate directly to school achievement. However, problems because employers describe jobs in the language of aptitudes whereas educators need jobs described in terms of learning objectives is not so difficult to solve as it first might appear. Aptitude and achievement tests both measure developed

abilities. Consequently, much guidance for curriculum developers can be gleaned from the existing literature on the validity of aptitude tests in work situations.

If there is to be more definitive information about academic achievement and job success, a national validation study would probably be appropriate. Key jobs could be selected in various occupations and tests relating specifically to academic curricula could be administered to prospective employees for these jobs. Persons who are selected for these jobs could have their performance measured after they have been working on the jobs a specified period of time. Then the relationship between test and job performance could be statistically determined, and educators could target curricula toward abilities measured by the most valid tests.

Although design of such a study is relatively straightforward, conduct of such a study would be extremely costly and cumbersome. There are a large number of administrative problems, not the least of which is obtaining employer cooperation. There are also many technical problems, such as obtaining comparable, adequate performance measures in different companies. Probably only through government financing could such a study be done. It should be noted that the government has financed other equally massive studies in the education field.

When one considers such a study, one must also take into account the social and legal situation which surrounds the imposition of education and ability requirements by employers in selecting employees. Because of government regulation and civil rights litigation, most employers have abandoned rigorous employee selection and instead rely upon casual

interviews and reference checks to select employees (Bureau of National Affairs, 1983) It is estimated that fewer than ten percent of employers give any ability tests at all in selecting employees. Education requirements have also been, to a large extent, abandoned for the same reasons. For example, the Bell System no longer imposes a high school graduation requirement for any of its jobs.

In view of the strong opposition to rigorous employee selection, it is doubtful whether employers will ever go back to ability testing or the application of education requirements in hiring. Consequently, the burden to improve employee quality appears to rest mainly with the educational system. The old adage that a rising tide lifts all ships applies here. What is sought is an improvement in the quality of literacy in all secondary school graduates, so that the average quality for those entering the workforce will be improved.

One may well ask what the employers' roles should be in providing this education. Certainly employers have a great concern for the literacy of the workforce. Should not employers provide some of the education needed to facilitate productivity in the workforce? This question could be the subject of long hours of debate. Certainly, I will not independently try to prescribe national roles for the employing community and the educational community; but I will suggest that communication between the business and education must be greatly expanded. This must take place on a national level, but it is even more important on a local level. There must be a combined effort of business and education to provide the literacy skills necessary for productive employment. The plan set forth

by the Task Force on Education for Economic Growth (Education Commission of the States, 1983) provides a broad outline by which such cooperation can be fostered.

Whether employers should take a direct role in providing education to promote adult literacy is a question that cannot be answered easily. There are many subsidiary questions which we do not have the research-based data to answer.

One of the most important of the questions is whether adult literacy training by employers is effective. Most of the adult literacy training done by employers has been focused on selected segments of society, mainly those who have had great difficulty in obtaining meaningful employment. There appear to be few, if any, general literacy training efforts directed at a broad segment of the population. It is difficult to generalize from the more narrow efforts and make statements about the effectiveness of adult literacy training in general. Also, the literature in this area is incomplete or inconclusive. Although there is evidence that some programs can provide some literacy gains, there is little support for the exaggerated claims one heard in the late 1960's about the effectiveness of adult literacy programs.

The most serious problem in evaluating the research on adult literacy is that most studies have not employed control groups. That is, achievement of persons who received training has not been compared with that of comparable groups of persons who did not receive training. Other methodological problems hinder interpretation of the literature. Program

objectives, training content, and participants' backgrounds have varied widely from program to program. Attrition rates have been high, both in training and on the job. Methods for evaluating program effectiveness and the establishment of criteria for what constitutes "success" in accomplishing the stated objectives have been poorly defined. Also, there have been no clear standards for evaluating alternative approaches to improving the employment prospects of various job applicant populations.

As a result of problems involved in delivering adult literacy training and evaluating it, most major employers have taken a cautious attitude toward the introduction of adult literacy training. The American Telephone and Telegraph Company, for example, offers voluntary courses in which areas such as spelling and mathematics may be enhanced, but presently does no basic training of the type which might be called remedial or basic literacy training. The American Telephone and Telegraph Company's policy on remedial training is fairly conservative and has the following four main points:

1. The cost/benefit of alternative methods for achieving training objectives should be reviewed and taken into account before final decisions about remedial programs are reached. Here, the emphasis is on examining actions like utilizing community-based programs and/or providing tuition aid. Also, it is strongly urged that such training not be undertaken unless there are realistic opportunities to place graduates in the jobs for which training prepares them.

2. Program objectives should be clearly defined and measurable; standards for program "success" should be clearly identified at the outset. The policy here goes on to state that criteria should be based upon behavior on the job, not just on the trainees' ability to pass entrance tests which are merely predictive of later job behavior.

3. Evaluation of program effectiveness should be carried out in a systematic fashion, with control groups and other appropriate elements of good study design.

4. Program objectives should be achievable, consistent with over-all company objectives, and tied to practical business outcomes. The policy here goes on to state that in the final analysis, the practical usefulness of remedial programs can be evaluated in view of the company's hiring, training, promotion, and affirmative action needs at the time. When in-house training efforts are undertaken, objectives should be realistic, achievable, and consistent with over-all company goals related to developing and maintaining a highly proficient and highly motivated workforce.

An informal survey of major corporations in the country indicates that the policies of these companies relative to adult literacy training are at least equally conservative. For the most part, literacy training is confined to voluntary skill-enhancement programs. Actual remediation is only used in specific, limited situations.

When earlier options regarding approaches to adult literacy on the part of employees were discussed, no preference for or statement of likelihood of use of the options was mentioned. Business decisions, of course, revolve around cost/benefit considerations. In-house training is an extremely costly solution to adult literacy problems. In most companies, efforts are constantly being made even to reduce the cost of specifically job related training, so it is small wonder that employers are generally conservative about literacy training for which the cost/benefits are less clear than they are for job skill training.

Adult literacy training has obviously been a concern in business where entry employees have been involved. However, it is now receiving consideration in a different area, that of training of displaced workers. The hard data in this area are scattered and inconclusive, but the possibility that literacy training might benefit at least some displaced workers must be considered in educational policy decisions.

The main theme of this paper, the need for data, has been expressed many times before in connection with many topics. It is, however, surprising, in view of the massive educational research efforts conducted over the past two decades, that adult literacy in the workplace has received so little research attention in the educational literature. Knowledge about what people do in jobs should be a major shaper of educational curricula. In vocational education, knowledge of jobs is considered crucial, yet such knowledge is not much less important in basic education. In particular, tne population of students who do not seek

higher education need to have skills and abilities based upon the needs of the employing community. This is not to say that all of the skills necessary to become an effective citizen should be ignored.

Obtaining worthwhile data on abilities needed in jobs, as has been indicated, is not an impossible task but it is, indeed, a complicated one. Unless jobs can be described accurately in a language which is useful for curriculum development, it may well be useless to discuss adult literacy training.

The need for facts extends further to the evaluation of adult literacy training when it is done. The literature in this area in inconclusive. Certainly, rigorous evaluation of adult literacy training is in order. Any who would venture into adult training of this should be guided by firm principles, such as those set forth by The American Telephone and Telegraph Company.

An investment in studying adult literacy problems and trying to solve them through rigorous application of techniques which are already available in the educational and psychological fields appears to be well worthwhile. An educated citizenry is necessary to cope with the problems our nation now faces, not the least of which is increased business competition on an international scale. Those of us in business and those in education must work together to solve these problems. We cannot continue to go our separate ways and not adequately address the pressing problems of adult literacy.

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